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capsule columnar, 12 mm. long, abruptly narrowed into and tipped by the long (4–5 mm.) styles; seeds obovoid, 3-angled, 1.5 mm. long, marked with low broken transverse ridges.

Missouri to Georgia, Florida and Texas; ascends to only a few meters above sea-level.

Fossil Diatomaceae from Nebraska, and their Relation to modern Species.*

By C. J. ELMORE.

Until very recently, fossil diatoms were scarcely known in Nebraska. In November, 1895, Dr. Barbour, professor of geology in the University of Nebraska, received some remarkably pure diatomaceous earth from Wheeler county. A little later he received some equally pure material from Mullen; and since that time a second deposit consisting of diatomaceous limestone has been found at Mullen, and a deposit of pure diatomaceous earth at Thedford. Some diatomaceous earth, largely calcareous, had been collected in Greeley county in 1887 by Mr. Russell and left with Dr. Bessey, but none of the species of diatoms that it contained had been identified.

Very little is known of these deposits. Dr. Barbour has not yet visited them, and the information that can be obtained from the collectors, who, in some cases at least, are the owners of the land on which the deposits occur, is very limited. Possibly the pure diatom deposits are of a sufficient extent to be valuable for commercial purposes, but this is somewhat doubtful.

The pure diatom deposit at Mullen consists of three layers. The middle layer contains practically nothing but diatom valves, while the top and bottom layers are mixed with considerable foreign matter. In the top layer six species were found that were not found in the middle layer, three of which are known in Nebraska only as fossil. In the lower layer only three species were found which were not found in the middle layer, all of which are common among modern Nebraska diatoms. It seems a little strange that the species in the lower layer should resemble mod-

* Read before Nebraska Academy of Sciences, January 3, 1896.

ern Nebraska species more closely than those in the top layer do. The species in all of these deposits show such a general resemblance to each other that it is likely that all the deposits were formed under the same conditions.

In these deposits 73 distinct species were identified, besides a number of so-called varieties not enumerated separately. Fifty-nine of these, according to De Toni Syll. Alg., are exclusively fresh-water species, 11 are fresh or submarine, 1 fresh or marine, 1 marine, and 1 submarine or marine. The last species, however, is found in Nebraska in fresh water. Only 28 of the species, according to De Toni, l. c., are known as fossil, leaving 45 species that have not been found before as fossil. A deposit in New Jersey, however, discovered by Dr. A. M. Edwards since the publication of the *Sylloge Algarum*, shows many of the same species that are found in these deposits. There is a striking similarity between the species found in these deposits and those now found living in Nebraska. Fifty-two of the 73 species are known to be living within the State; and considering that only a comparatively small number of the living diatoms of Nebraska are known, it is likely that nearly all of the fossil species are now to be found living in the region.

A comparison of these fossil diatoms with modern ones has led me to the conclusion that the term *variety* cannot be properly used in dealing with diatoms. The forms classed as varieties may be divided into two classes: (1) Conditions of some species, and (2) closely related species. Diatoms vary so greatly in form and size between one auxospore stage and the next that the same species may occur in many forms, all of which are but stages in the life-history of the organism. Many of these different conditions have been described as species, and have been reduced to the rank of varieties by later writers who saw more or less clearly their true relationship. But such conditions are not varieties any more than the prothallium of a fern or the protonema of a moss are varieties of the plants to which they belong. The other forms which are classed as varieties are merely closely related species. These fossil diatoms show the same species and the same variations from the species that modern ones do. If these variations are only temporary and return to the original form by the forma-

tion of auxospores they come under the first class. If they do not return to the original form, but have remained distinct from it since Tertiary times, they have certainly earned their title to the name *species*, and should not be classed as varieties. Evolution in diatoms since their first appearance as such is not easy to trace; in fact, there appears to have been none. Unless we can find in them evidence of continued evolution, we cannot consistently recognize varieties among them.

The following is a list of the species identified in these deposits:*

Abbreviations used in the list. (The data as to habitat, etc., are taken from De Toni, l. c.)

Fr. A freshwater species.

Mar. A marine species.

Subm. A submarine species.

Foss. A species known elsewhere as fossil.

Neb. A species that has been found living in Nebraska.

M. Found in the middle layer of the Mullen deposit.

M 1. Found in the top layer of the Mullen deposit.

M 2. Found in the bottom layer of the Mullen deposit.

L. Found in diatomaceous limestone at Mullen.

G. Found in Greeley county deposit.

W. Found in Wheeler county deposit.

T. Found in Thedford deposit.

Amphora ovalis Kuetz. Fr. Neb. Very rare. Probably the form represented by var. *gracilis* (Ehr.) in M. L.

Coconeis placentula Ehr. Fr. and Mar. Foss. Neb. T. M. W.

Cymatopleura elliptica (Bréb.) W. Sm. Fr. and subm. Neb. Only a fragment found. M2.

Cymatopleura solea (Bréb.) W. Sm. Fr. Neb. Not common. M2.

Cymbella cistula (Hempr.) Kirchn. Fr. Neb. Common, and quite variable. M. W. L. G.

Cymbella cuspidata Kuetz. Fr. Foss. Neb. Common. Some specimens measure 98 μ long. W. M. T.

* I am indebted to Prof. C. S. Boyer for examining my slides and for other suggestions.

Cymbella cymbiformis (Kuetz.) Bréb. Fr. Neb. Common. M. W. L. In the limestone at Mullen a form occurs like var. *parva* (W. Sm.). V.H.

Cymbella gastroides Kuetz. Fr. Foss. Neb. Common. M. T. G.

Cymbella inaequalis (Ehr.) Fr. Foss. Neb. Common. M. T.

Cymbella lanceolata (Ehr.) Kirchn. Fr. Common. M. L. G.

Cymbella levis Naeg. Fr. Rare. M.

Cystopleura gibba (Ehr.) Kuntze. Fr. and subm. Foss. Neb. Rather common. T. M. W. L. The form called var. *ventricosa* (Ehr.) Grun. also occurs.

Cystopleura ocellata (Ehr.). Kuntze. Fr. Foss. Rather common. M1.

Cystopleura turgida (Ehr.). Kuntze. Fr. and subm. Neb. Quite common, as are also var. *vertagus* (Kuetz.) Grun. and var. *Westermanii* (Ehr.) Grun. M. W. L.; var. *Westermanii* is cited (De Toni, Syll. Alg. 2: 778) as fossil.

Cystopleura Zebra (Ehr.) Kuntze. Fr. and subm. Foss. Neb. Not very common. M. W. L.

Encyonema caespitosum Kuetz. Fr. Neb. Rare. M.

Eunotia Arcus Ehr. Fr. Foss. Common. G. M.

Eunotia Diodon Ehr. Fr. Foss. Rare. M.

Eunotia formica Ehr. Fr. Rather common. G. A form reaching 225 μ in length resembling var. *elongata* Grun. occurs rather common at Mullen.

Eunotia lunaris (Ehr.) Grun. Fr. Neb. Common. M. L.

Fragilaria construens (Ehr.) Grun. Fr. Foss. Neb. Rather common. M. T. W. The form represented by var. *venter* Grun. is much more common, being the most common one in the Weller Co. deposits.

Fragilaria elliptica Schum. Fr. Common. W. M.

Gomphonema acuminatum Ehr. Fr. Foss. Neb. Not common M. Common G.

Gomphonema constrictum Ehr. Fr. Foss. Neb. Rather common. W. M.

Gomphonema gracile Ehr. Fr. Neb. Common. M. L. G.

Gomphonema herculaneum Ehr. Fr. Rare. M.

Gomphonema intricatum Kuetz. Fr. Neb. Common. G.

Gomphonema montanum subclavatum Grun. Fr. Neb. Rather common. W.

Gomphonema parvulum (Kuetz.) Rabenh. Fr. Neb. Not very common. M. T.

Gomphonema Turris Ehr. Fr. Neb. Common. M.

Gomphonema Vibrio Ehr. Fr. Foss. Rare. M. Common. G.

Hantzschia Amphioxys (Ehr.) Grun. Fr. and subm. Neb. Common. W. M. Var. *major* Grun. M1.

Melosira distans (Ehr.) Kuetz. Fr. Foss. Neb. Very common. M. L. G. W.

Meridion circulare (Grev.) Ag. The specimens evidently belong to *Meridion constrictum* Ralfs, but that is probably only a form of *M. circulare*. Fr. Foss. Neb. Rare. M.

Navicula ambigua Ehr. Fr. Neb. The specimens are all in "resting" condition, described by Van Heurck (Syn. 100) as form *craticula*. No specimens in normal condition were found. L.

Navicula bacilliformis Grun. Fr. Neb. Rare. M. L.

Navicula cuspidata Kuetz. Fr. Neb. This species occurs both in normal and "resting" condition. Not very common. W. M. L.

Navicula dicephala Ehr. Fr. Foss. Neb. Rare. M.

Navicula elliptica Kuetz. Fr. and subm. Foss. Neb. Rather common. M. M1.

Navicula Gigas (Ehr.) Kuetz. Fr. Not common. M.

Navicula Hungarica Grun. Fr. and subm. Rare. L.

Navicula Iridis Ehr. Fr. Neb. Varieties *affinis* (Ehr.) V. H., *amphigomphus* (Ehr.) V. H., and *amphirhynchus* (Ehr.) De Toni occur with the species. The specimens of the type are all rather small. W. M. L. T. Var. *amphigomphus* is the only form that De Toni, l. c., cites as fossil.

Navicula Legumen Ehr. Fr. Neb. Rare. M1.

Navicula limosa Kuetz. Fr. Neb. The specimens vary from the type, being as long as 95 μ , and scarcely inflated at the apices. Common. G.

Navicula nobilis (Ehr.) Kuetz. Fr. Foss. Rather common. M.

Navicula oblonga Kuetz. Fr. Foss. Neb. Rather common. M. T.

Navicula parva (Ehr.). Fr. Neb. Not very common. M.

Navicula placentula (Ehr.) Kuetz. Fr. and subm. Foss. Found with var. *tumida* (W.Sm.). This species shows all variations from globose-capitate to slightly attenuate-rostrate. The specimens are larger than those described by De Toni (Syll. Alg. 2: 55) and have coarser striations. The globose-capitate forms seem not to be described, but they evidently belong to the same species as the attenuate forms. Common. L. M.

Navicula pupula Kuetz. Fr. Neb. Not very common. W. M.

Navicula radiosa Kuetz. Fr. Foss. Neb. Var. *acuta* (W.Sm.) Grun., is found with the type, from which it scarcely differs. Rather common. M2. L.

Navicula rostrata Ehr. Fr. Foss. Neb. Not very common. W. *Navicula sphaerophora* Kuetz, appears to be merely a form of *Navicula rostrata*. M.

Navicula serians (Bréb.) Kuetz. Fr. Foss. Neb. Rare. L.

Navicula trinodis inflata Schultze, occurs, but is rare. Fr. Neb. M.

Navicula viavidus (Nitz.) Kuetz. Fr. Foss. Neb. Not very common. M. L. G.

Navicula viridula Slesvicensis (Grun.) V. H. Fr. and subm. Neb. Rare. M.

Nitzschia amphibia Grun., and *Nitzschia Frauenfeldii* Grun., which seems to be merely a form of the former. Fr. Neb. M. G. L.

Nitzschia obtusa W. Sm. Fr. Common. L.

Nitzschia sinuata (W. Sm.) Grun. Fr. Not very common. L.

Nitzschia spectabilis (Ehr.) Ralfs. Subm. and Mar. Foss. Found in Nebraska in fresh water. Rare. L.

Nitzschia subtilis (Kuetz.) Grun. The form represented by var. *paleacea* Grun., occurs, but is rare. Fr. and subm. Neb. M. L.

Nitzschia vermicularis (Kuetz.) Hantzsch. Fr. Neb. Not common. M2.

Opephora pacifica (Grun.) Petit. Marine. This is the only species found in any of these deposits that has formerly been known as exclusively marine. Rather common. M. T.

Stauroneis anceps Ehr. Fr. and subm. Neb. Not very common. L.

- Stauroneis minutissima* Lagerst. Fr. Rare. M.
Stauroneis Phocnicenteron Kuetz. Fr. Neb. Rather common.
 G. M. L.
Suriraya spiralis Kuetz. Fr. Rare. M.
Suriraya splendida (Ehr.) Kuetz. Fr. and subm. Neb. Rare.
 M₁.
Synedra capitata Ehr. Fr. Foss. Neb. Rather common.
 W. M. L. T. The form represented by *Synedra ulna longissima*
 (W. Sm.) Brun, seems rather to belong to this species. Not
 very common. M. W.
Synedra radians Kuetz. Fr. Rare. M.
Synedra tenuissima (Kuetz.) Fr. Neb. Rare. M.
Synedra ulna (Nitz.) Ehr. Fr. Foss. Neb. The forms called
 var. *amphirhynchus* (Ehr.) Grun. and var. *oxyrhynchus* (Kuetz.) V.
 H., occur, but not common. M. L.
Tabellaria fenestrata Kuetz. Fr. Very common. M.
Tetracyclus lacustris Ralfs. Fr. Foss. Rare. G.

Notes upon Maine Plants.

BY F. L. HARVEY.

The following plants found in Maine and not in Fernald's catalogue or supplement may be of interest to botanists. New localities for a few are added.

Geranium molle L. Common in the lawns on the college ground. Noticed for two seasons; apparently spontaneous.

Anthemis tinctoria L. This was found in Brewer, in 1887, by Rev. Mr. Merrill, and we have it from Mr. C. H. Gould, collected at N. Bridgton, where it was abundant in fields.

Hypochaeris glabra L. Has been found on the college grounds occasionally. We think Mr. Fernald found it in 1890 and it has been detected since. It should not be forgotten.

Lobelia leptostachys A. DC. We have a fine specimen of the species collected in an old field at Brownfield, Me., by Geo. Haley, probably brought in from the West in grass or clover seed. It possibly may gain a foothold.